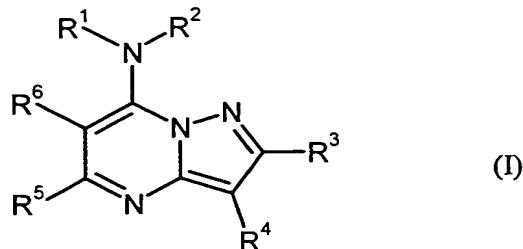


Claims

1. A pyrazolopyrimidine of the formula



in which

5 R¹ represents optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted cycloalkyl or optionally substituted heterocyclyl,

R² represents hydrogen or alkyl, or

10 R¹ and R² together with the nitrogen atom to which they are attached represent an
optionally substituted heterocyclic ring,

R³ represents hydrogen or alkyl,

R⁴ represents optionally substituted alkenyl or optionally substituted alkynyl,

R⁵ represents halogen, CN, alkyl, alkoxy or alkylthio and

R⁶ represents alkyl, cycloalkyl or optionally substituted aryl.

15 2. The pyrazolopyrimidine of the formula (I) as claimed in claim 1 in which

R¹ represents alkyl having 1 to 6 carbon atoms which may be mono- to pentasubstituted by identical or different substituents from the group consisting of halogen, cyano, hydroxyl, alkoxy having 1 to 4 carbon atoms and cycloalkyl having 3 to 6 carbon atoms, or

20 R¹ represents alkenyl having 2 to 6 carbon atoms which may be mono- to trisubstituted by identical or different substituents from the group consisting of halogen, cyano, hydroxyl, alkoxy having 1 to 4 carbon atoms and cycloalkyl having 3 to 6 carbon atoms, or

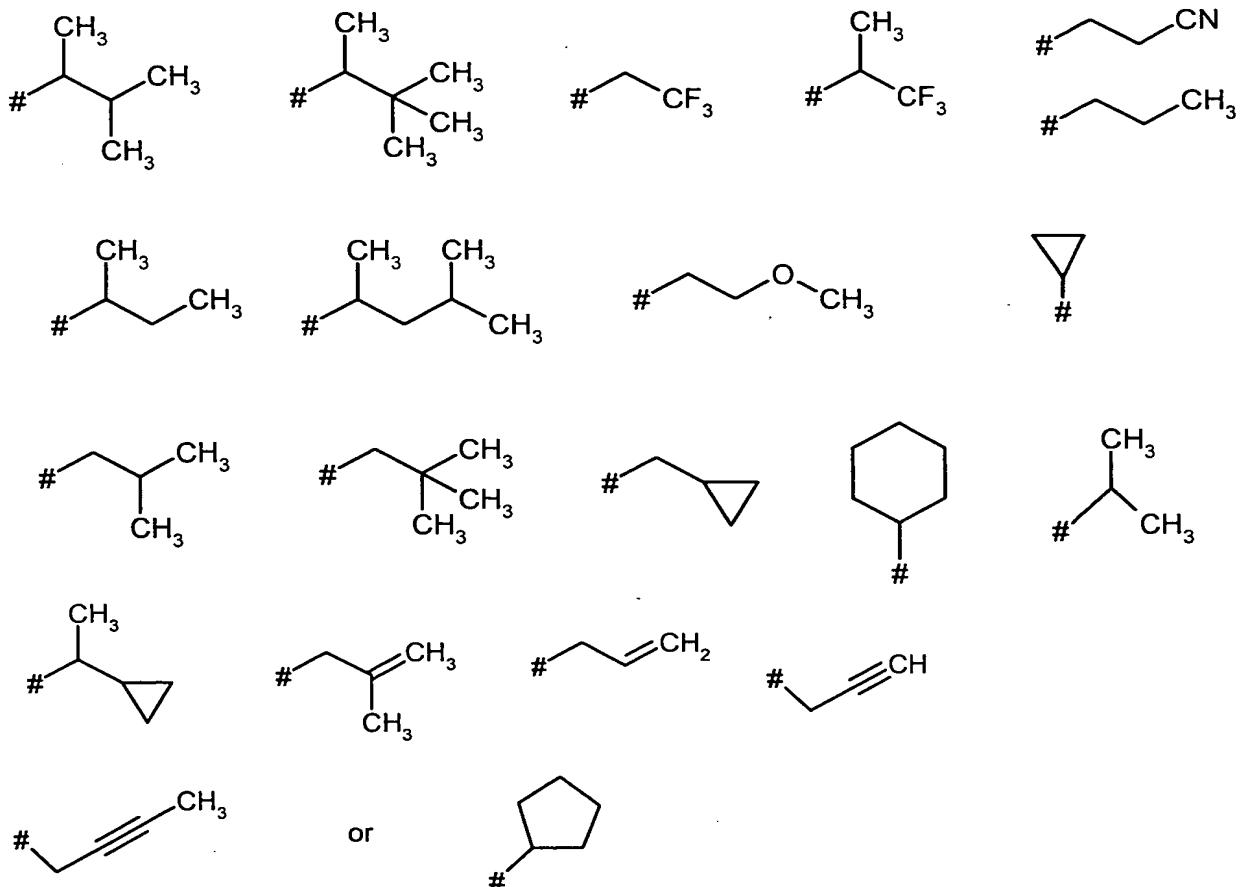
- R¹ represents alkynyl having 3 to 6 carbon atoms which may be mono- to trisubstituted by identical or different substituents from the group consisting of halogen, cyano, alkoxy having 1 to 4 carbon atoms and cycloalkyl having 3 to 6 carbon atoms, or
- 5 R¹ represents cycloalkyl having 3 to 6 carbon atoms which may be mono- to trisubstituted by identical or different substituents from the group consisting of halogen and alkyl having 1 to 4 carbon atoms, or
- 10 R¹ represents saturated or unsaturated heterocyclyl having 5 or 6 ring members and 1 to 3 heteroatoms, such as nitrogen, oxygen and/or sulfur, where the heterocyclyl may be mono- or disubstituted by halogen, alkyl having 1 to 4 carbon atoms, cyano, nitro and/or cycloalkyl having 3 to 6 carbon atoms,
- R² represents hydrogen or alkyl having 1 to 4 carbon atoms, or
- 15 R¹ and R² together with the nitrogen atom to which they are attached represent a saturated or unsaturated heterocyclic ring having 3 to 6 ring members, where the heterocycle may contain a further nitrogen, oxygen or sulfur atom as ring member and where the heterocycle may be substituted up to three times by fluorine, chlorine, bromine, alkyl having 1 to 4 carbon atoms and/or haloalkyl having 1 to 4 carbon atoms and 1 to 9 fluorine and/or chlorine atoms,
- R³ represents hydrogen or alkyl having 1 to 4 carbon atoms,
- 20 R⁴ represents alkenyl having 2 to 6 carbon atoms or alkynyl having 2 to 6 carbon atoms,
- or
- 25 R⁴ represents alkenyl having 2 to 4 carbon atoms which is substituted by carboxyl, methoxycarbonyl, ethoxycarbonyl, formyl or halogen, or represents alkynyl having 2 to 4 carbon atoms which is substituted by carboxyl, methoxycarbonyl or ethoxycarbonyl, formyl or halogen,
- R⁵ represents fluorine, chlorine, bromine, CN, alkoxy having 1 to 4 carbon atoms or alkylthio having 1 to 4 carbon atoms and

R^6 represents alkyl having 1 to 6 carbon atoms or represents cycloalkyl having 3 to 6 carbon atoms, or

represents phenyl which may be mono- to tetrasubstituted by identical or different substituents.

5 3. The pyrazolopyrimidine of the formula (I) as claimed in claim 1 or 2 in which

R^1 represents a radical of the formula



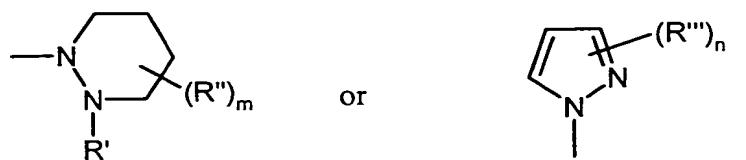
10 where # denotes the point of attachment and where for those radicals which may be present in optically active form each of the possible stereoisomers or mixtures thereof may be present,

R^2 represents hydrogen, methyl, ethyl or propyl, or

15 R^1 and R^2 together with the nitrogen atom to which they are attached represent pyrrolidinyl, piperidinyl, morpholinyl, thiomorpholinyl, piperazinyl, 3,6-dihydro-1(2H)-piperidinyl or tetrahydro-1(2H)-pyridazinyl, where these radicals may be substituted by 1 to 3 fluorine atoms, 1 to 3 methyl groups and/or trifluoromethyl,

or

R^1 and R^2 together with the nitrogen atom to which they are attached represent a radical of the formula



5

in which

R' represents hydrogen or methyl,

R'' represents methyl, ethyl, fluorine, chlorine or trifluoromethyl,

m represents the number 0, 1, 2 or 3, where R'' represents identical or different radicals if m represents 2 or 3,

10

R''' represents methyl, ethyl, fluorine, chlorine or trifluoromethyl

and

n represents the number 0, 1, 2 or 3, where R''' represents identical or different radicals if n represents 2 or 3,

R^3 represents hydrogen, methyl, ethyl, propyl or isopropyl,

15

R^4 represents straight-chain or branched alkenyl having 2 to 5 carbon atoms, where each of these radicals may be monosubstituted by carboxyl, methoxycarbonyl, ethoxycarbonyl, formyl or halogen, or

R^4 represents alkynyl having 2 to 5 carbon atoms, where each of these radicals may be monosubstituted by carboxyl, methoxycarbonyl or ethoxycarbonyl,

20

R^5 represents fluorine, chlorine, CN, methoxy, ethoxy, methylthio or ethylthio,

and

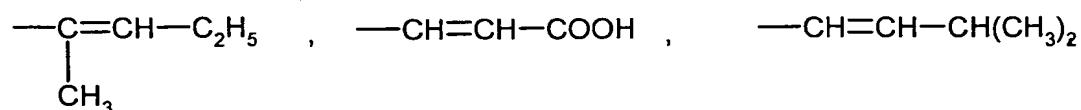
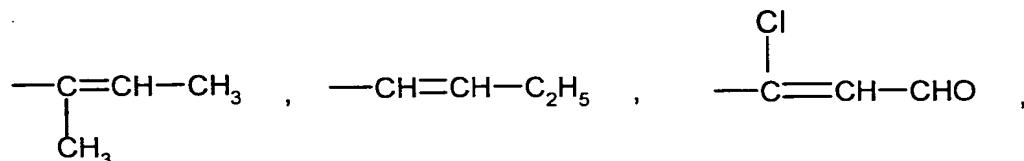
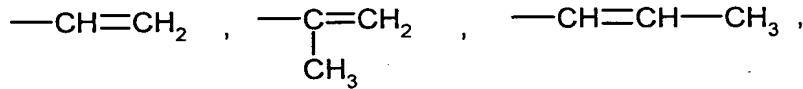
R^6 represents straight-chain or branched alkyl having 1 to 4 carbon atoms, represents cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl, or

- R⁶ represents phenyl which may be mono- to trisubstituted by identical or different substituents from the group consisting of fluorine, chlorine, bromine, cyano, nitro, formyl, methyl, ethyl, n- or i-propyl, n-, i-, s- or t-butyl, allyl, propargyl, methoxy, ethoxy, n- or i-propoxy, methylthio, ethylthio, n- or i-propylthio, methylsulfinyl, 5 ethylsulfinyl, methylsulfonyl, ethylsulfonyl, allyloxy, propargyloxy, trifluoromethyl, trifluoroethyl, difluoromethoxy, trifluoromethoxy, difluorochloromethoxy, trifluoroethoxy, trifluoromethylthio, difluorochloromethylthio, trifluoromethylthio, trifluoromethylsulfinyl, 10 trifluoromethylsulfonyl, trichloroethynyl, trifluoroethynyl, chloroallyloxy, iodopropargyloxy, methylamino, ethylamino, n- or i-propylamino, dimethylamino, diethylamino, acetyl, propionyl, acetyloxy, methoxycarbonyl, ethoxycarbonyl, hydroximinomethyl, hydroximinoethyl, methoximinomethyl, ethoximinomethyl, methoximinoethyl, ethoximinoethyl, cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl,
- 15 2,3-attached 1,3-propanediyl, methylenedioxy (-O-CH₂-O-) or 1,2-ethylenedioxy (-O-CH₂-CH₂-O-), where these radicals may be mono- or polysubstituted by identical or different substituents from the group consisting of fluorine, chlorine, methyl, ethyl, n-propyl, i-propyl and trifluoromethyl.

4. The pyrazolopyrimidine of the formula (I) according to one or more of claims 1 to 3 in
20 which

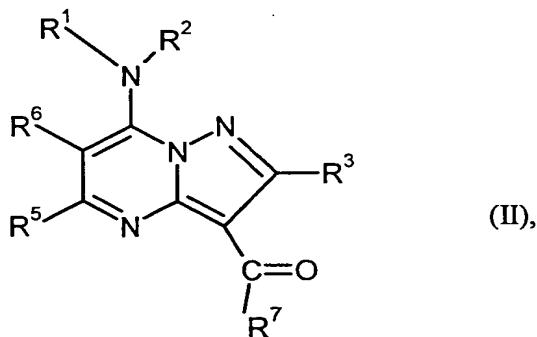
R¹, R², R³ and R⁵ have the particularly preferred meanings given above,

R⁴ represents a radical of the formula



-CH=CH-CO-OCH₃, -CH=CH-CO-OC₂H₅, -C≡CH, -C≡C-CH₃, -C≡C-C₂H₅, -C≡C-C₃H₇, -C≡C-COOH, -C≡C-CO-OCH₃ or -C≡C-CO-OC₂H₅ and

- R⁶ represents methyl, ethyl, propyl, isopropyl, n-butyl, tert-butyl, cyclopropyl, cyclopentyl or cyclohexyl, or
- 5 R⁶ represents 2,4-, 2,5- or 2,6-disubstituted phenyl or 2-substituted phenyl or represents 2,4,6-trisubstituted phenyl, where the substituents are selected from the group consisting of fluorine, chlorine, bromine, cyano, nitro, formyl, methyl, ethyl, n- or i-propyl, n-, i-, s- or t-butyl, allyl, propargyl, methoxy, ethoxy, n- or i-propoxy, methylthio, ethylthio, n- or i-propylthio, methylsulfinyl, ethylsulfinyl, 10 methylsulfonyl, ethylsulfonyl, allyloxy, propargyloxy, trifluoromethyl, trifluoroethyl, difluoromethoxy, trifluoromethoxy, difluorochloromethoxy, trifluoroethoxy, difluoromethylthio, difluorochloromethylthio, trifluoromethylthio, trifluoromethylsulfinyl, trifluoromethylsulfonyl, trichloroethynyl, trifluoroethynyl, chloroallyloxy, iodopropargyloxy, methylamino, ethylamino, n- or i-propylamino, dimethylamino, diethylamino, acetyl, propionyl, acetyloxy, methoxycarbonyl, ethoxycarbonyl, hydroximinomethyl, hydroximinoethyl, methoximinomethyl, ethoximinomethyl, methoximinoethyl, ethoximinoethyl, cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl,
- 15 20 2,3-attached 1,3-propanediyl, methylenedioxy (-O-CH₂-O-) or 1,2-ethylenedioxy (-O-CH₂-CH₂-O-), where these radicals may be mono- or polysubstituted by identical or different substituents from the group consisting of fluorine, chlorine, methyl, ethyl, n-propyl, i-propyl and trifluoromethyl.
5. A process for preparing pyrazolopyrimidines of the formula (I) as claimed in claim 1, characterized in that
- 25 a) pyrazolopyrimidines of the formula



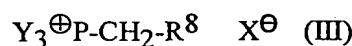
in which

R^1, R^2, R^3, R^5 and R^6 are as defined above and

R^7 represents hydrogen or alkyl

are reacted with phosphonium salts of the formula

5



in which

Y represents alkyl, cycloalkyl, aralkyl or phenyl

X represents an anion, such as bromide, and

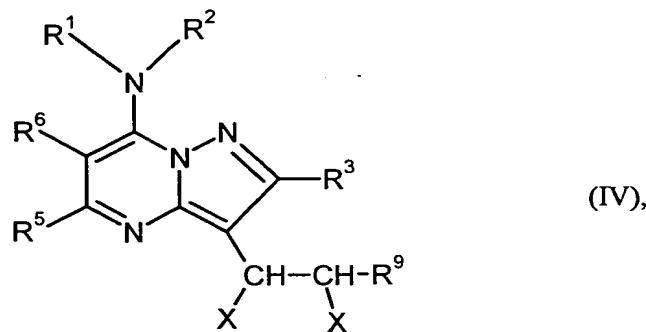
R^8 represents hydrogen or optionally substituted alkyl

10

in the presence of a base in the presence of a diluent,

or

b) pyrazolopyrimidines of the formula



in which

15 R^1, R^2, R^3, R^5 and R^6 are as defined above,

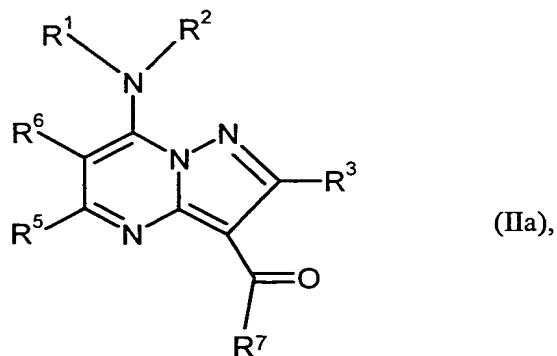
R^9 represents hydrogen or optionally substituted alkyl,

X represents chlorine or bromine

are reacted with strong bases in the presence of a diluent,

or

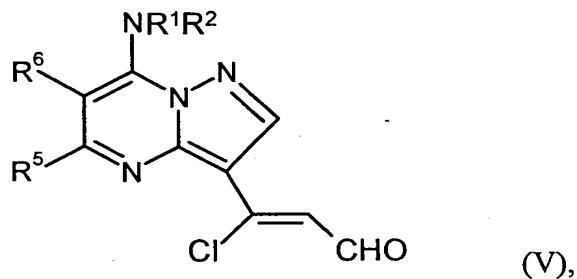
c) pyrazolopyrimidines of the formula



in which

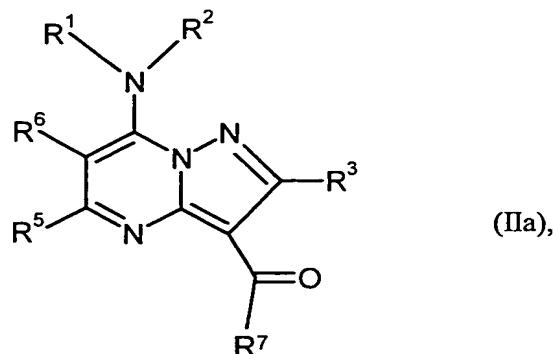
R¹, R², R³, R⁵, R⁶ and R⁷ are as defined above

5 are initially reacted with phosphorus oxychloride in the presence of dimethylformamide and then further with a base to give a compound of the formula (V)



or

- d) pyrazolopyrimidines of the formula



in which

R^1, R^2, R^3, R^5, R^6 and R^7 are as defined above, are reacted with Grignard compounds

$R^8\text{-CH}_2\text{-Mg X}$,

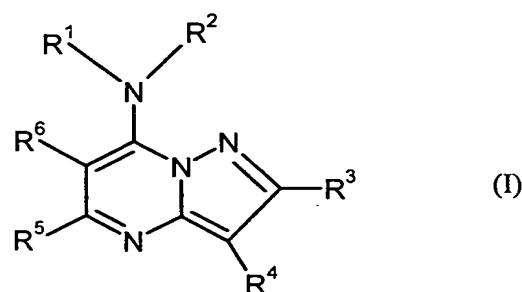
where R^8 is as defined above, and then acidified.

5. A composition for controlling unwanted microorganisms, characterized in that it comprises at least one pyrazolopyrimidine of the formula (I) as claimed in one or more of claims 1 to 4, in addition to extenders and/or surfactants.
10. The composition as claimed in claim 6, comprising at least one further fungicidally or insecticidally active compound.
15. The use of pyrazolopyrimidines of the formula (I) as claimed in one or more of claims 1 to 4 for controlling unwanted microorganisms.
20. A method for controlling unwanted microorganisms, characterized in that pyrazolopyrimidines of the formula (I) according to one or more of claims 1 to 4 are applied to the unwanted microorganisms and/or their habitat.
10. The process for preparing compositions for controlling unwanted microorganisms, characterized in that pyrazolopyrimidines of the formula (I) according to one or more of claims 1 to 4 are mixed with extenders and/or surfactants.

Pyrazolopyrimidines

A b s t r a c t

Novel pyrazolopyrimidines of the formula



in which

R¹, R², R³, R⁴, R⁵ and R⁶ are as defined in the description,

a plurality of processes for preparing these compounds and their use for controlling unwanted microorganisms.